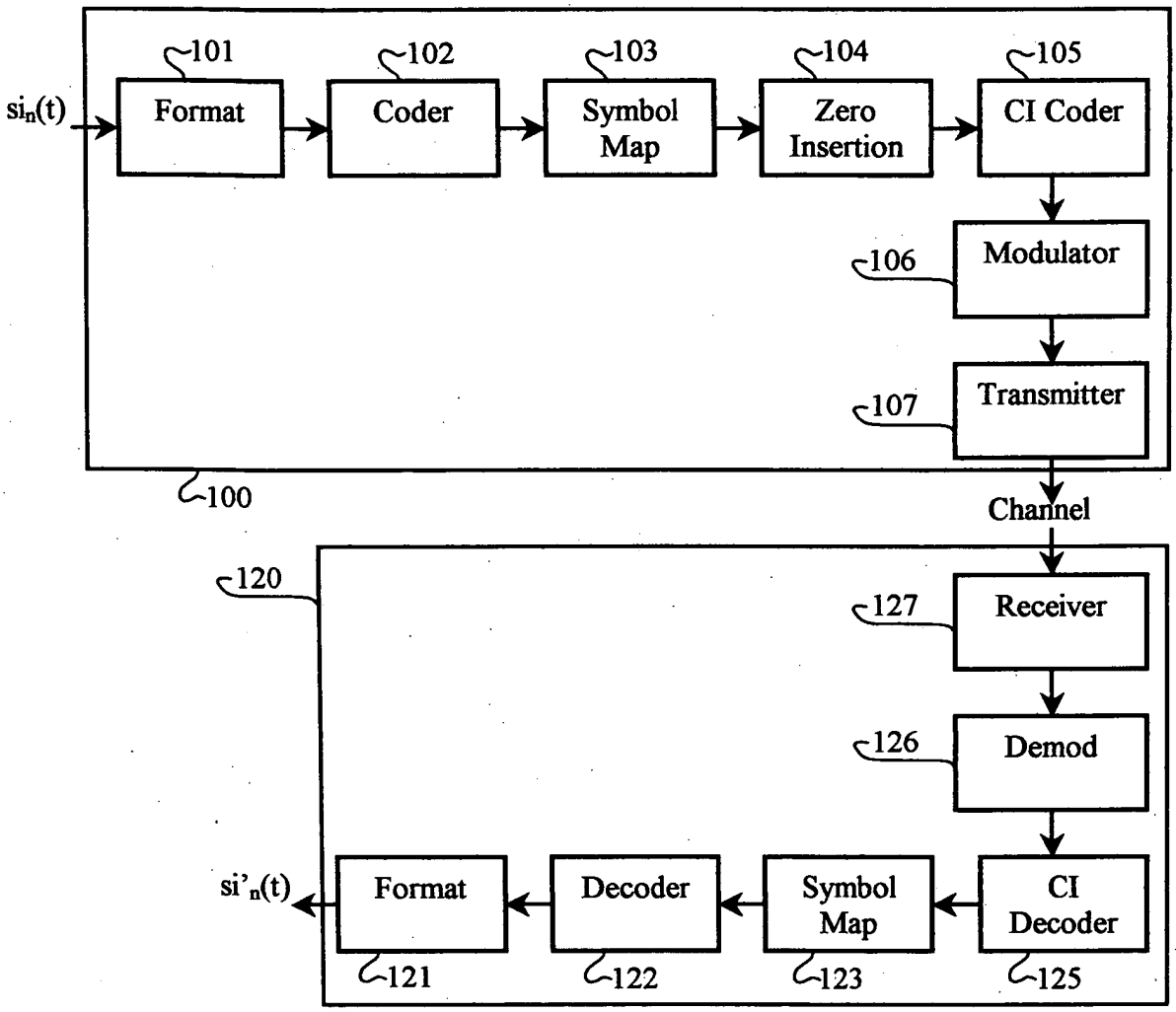
$si_n(t)$
101
Format
102
Coder
103
Symbol Map
104
Zero Insertion
105
CI Coder
106
Modulator
107
Transmitter
100
Channel
120
127
Receiver
126
Demod
$si'_n(t)$
Format
Decoder
Symbol Map
CI Decoder
121
122
123
125

FIG. 1

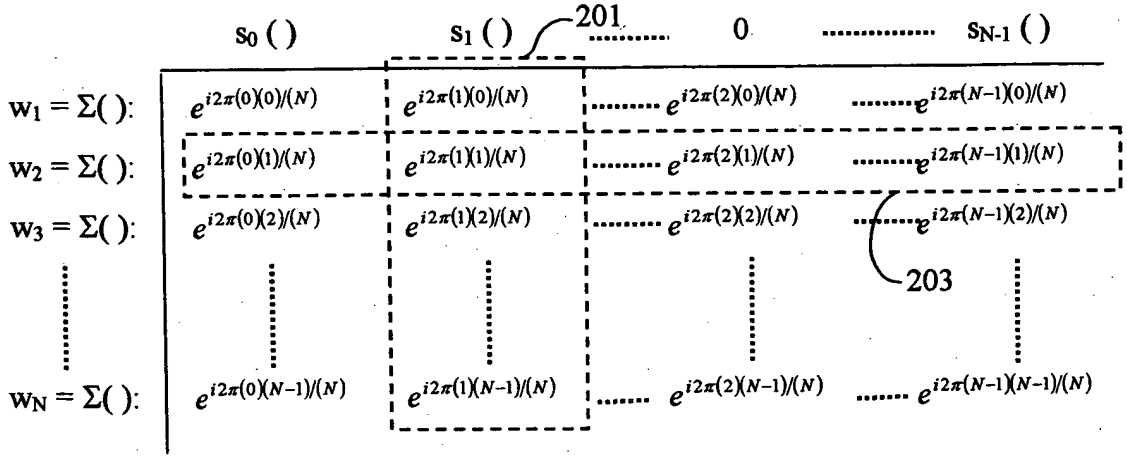
s_0 ( )
s_1 ( )
201
0
s_{N-1} ( )
$w_1 = \Sigma( )$:
$w_2 = \Sigma( )$:
$w_3 = \Sigma( )$:
$w_N = \Sigma( )$:
$e^{i2\pi(0)(0)/(N)}$
$e^{i2\pi(1)(0)/(N)}$
$e^{i2\pi(2)(0)/(N)}$
$e^{i2\pi(N-1)(0)/(N)}$
$e^{i2\pi(0)(1)/(N)}$
$e^{i2\pi(1)(1)/(N)}$
$e^{i2\pi(2)(1)/(N)}$
$e^{i2\pi(N-1)(1)/(N)}$
$e^{i2\pi(0)(2)/(N)}$
$e^{i2\pi(1)(2)/(N)}$
$e^{i2\pi(2)(2)/(N)}$
$e^{i2\pi(N-1)(2)/(N)}$
203
$e^{i2\pi(0)(N-1)/(N)}$
$e^{i2\pi(1)(N-1)/(N)}$
$e^{i2\pi(2)(N-1)/(N)}$
$e^{i2\pi(N-1)(N-1)/(N)}$

FIG. 2

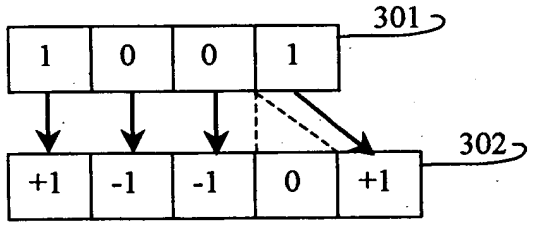
301
1
0
0
1
302
+1
-1
-1
0
+1

FIG. 3

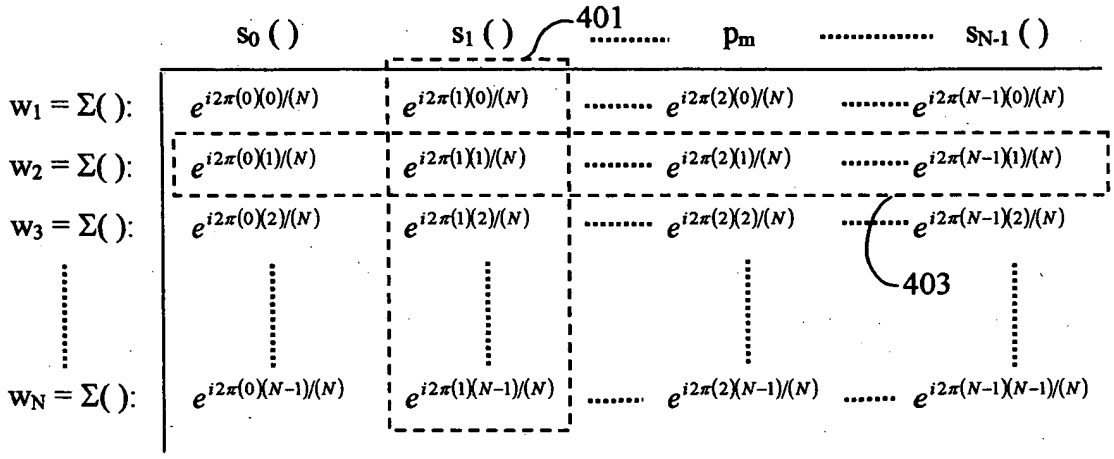
s_0 ( )
s_1 ( )
401
p_m
s_{N-1} ( )
$w_1 = \Sigma( )$:
$w_2 = \Sigma( )$:
$w_3 = \Sigma( )$:
$w_N = \Sigma( )$:
$e^{i2\pi(0)(0)/(N)}$
$e^{i2\pi(1)(0)/(N)}$
$e^{i2\pi(2)(0)/(N)}$
$e^{i2\pi(N-1)(0)/(N)}$
$e^{i2\pi(0)(1)/(N)}$
$e^{i2\pi(1)(1)/(N)}$
$e^{i2\pi(2)(1)/(N)}$
$e^{i2\pi(N-1)(1)/(N)}$
$e^{i2\pi(0)(2)/(N)}$
$e^{i2\pi(1)(2)/(N)}$
$e^{i2\pi(2)(2)/(N)}$
$e^{i2\pi(N-1)(2)/(N)}$
403
$e^{i2\pi(0)(N-1)/(N)}$
$e^{i2\pi(1)(N-1)/(N)}$
$e^{i2\pi(2)(N-1)/(N)}$
$e^{i2\pi(N-1)(N-1)/(N)}$

FIG. 4

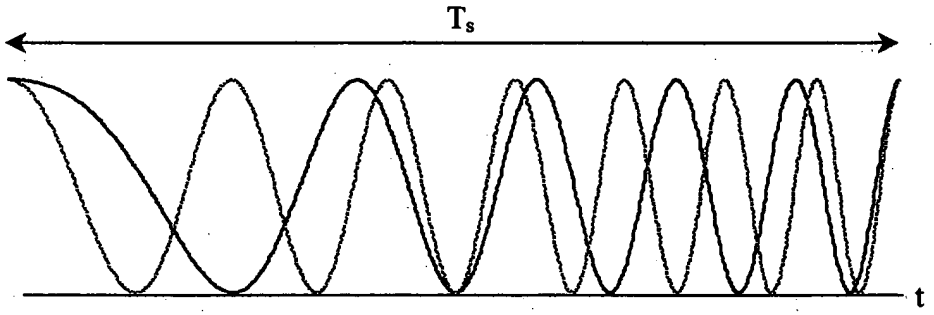
T_s
t

FIG. 5

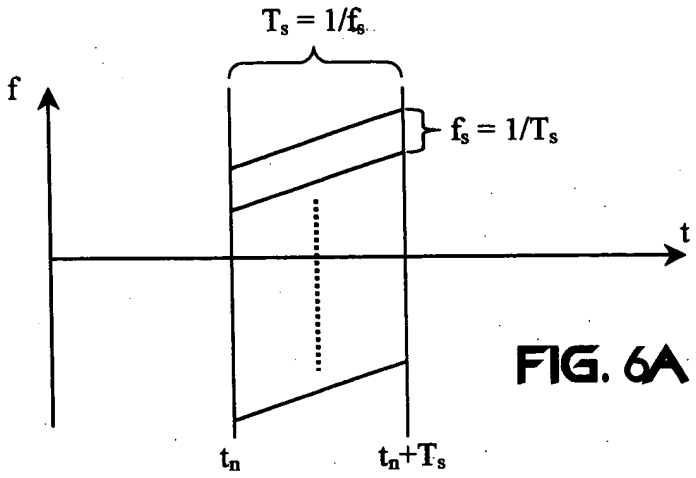

FIG. 6A

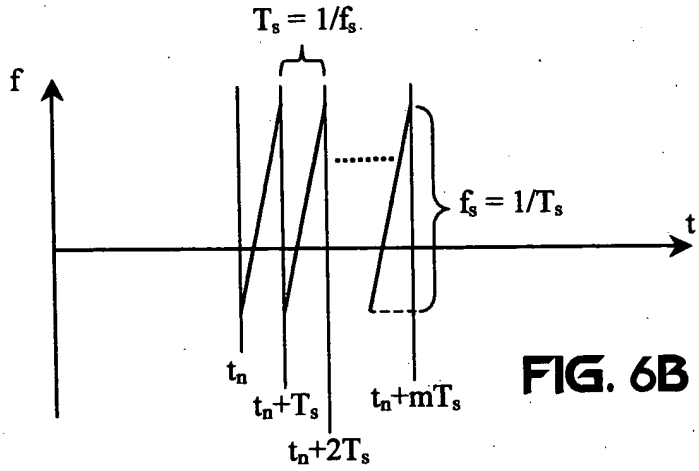

FIG. 6B

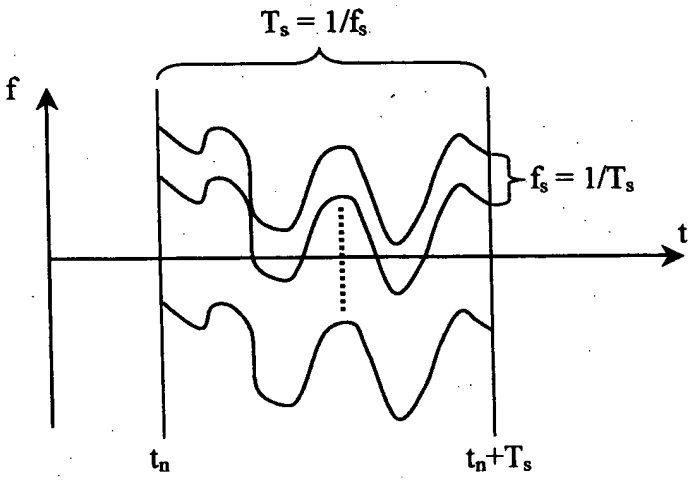

FIG. 6C

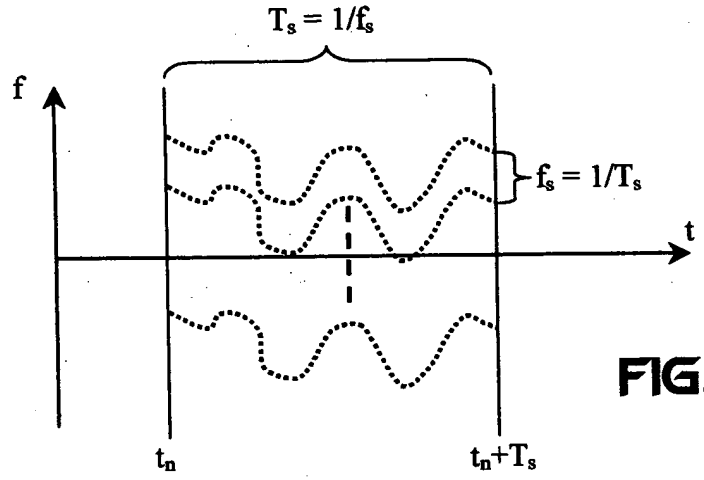

FIG. 6D

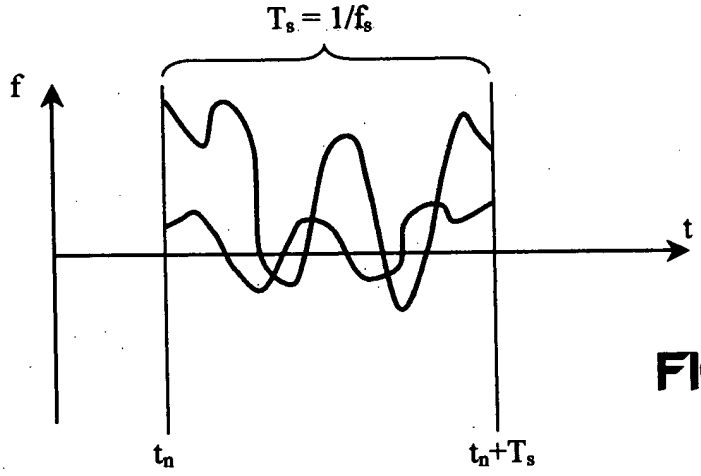

FIG. 6E

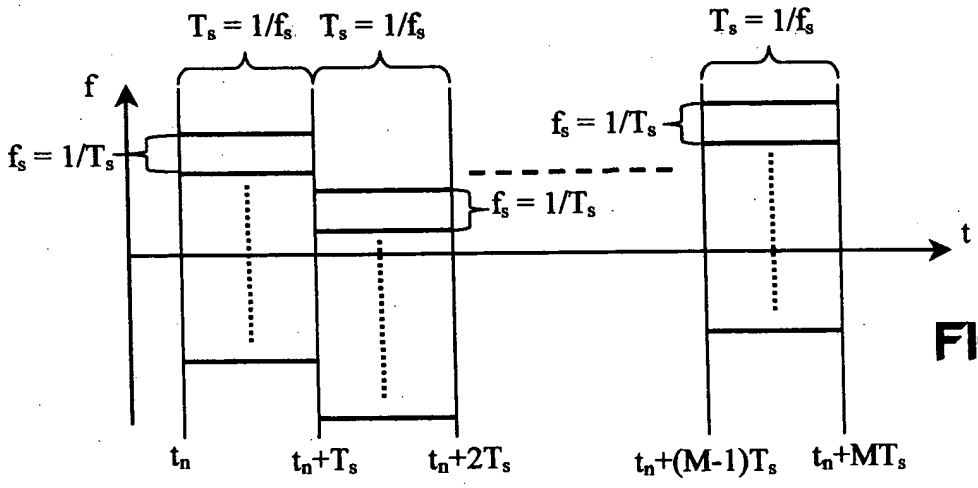

FIG. 6F

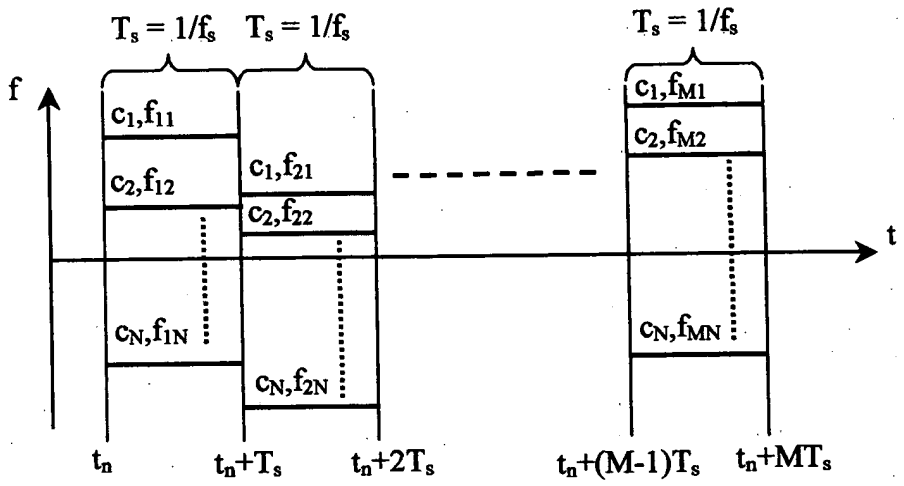
$T_s = 1/f_s$
$T_s = 1/f_s$
$T_s = 1/f_s$
f
t
c_1, f_{11}
c_2, f_{12}
c_N, f_{1N}
c_1, f_{21}
c_2, f_{22}
c_N, f_{2N}
c_1, f_{M1}
c_2, f_{M2}
c_N, f_{MN}
t_n
t_n+T_s
t_n+2T_s
$t_n+(M-1)T_s$
t_n+MT_s

FIG. 6G

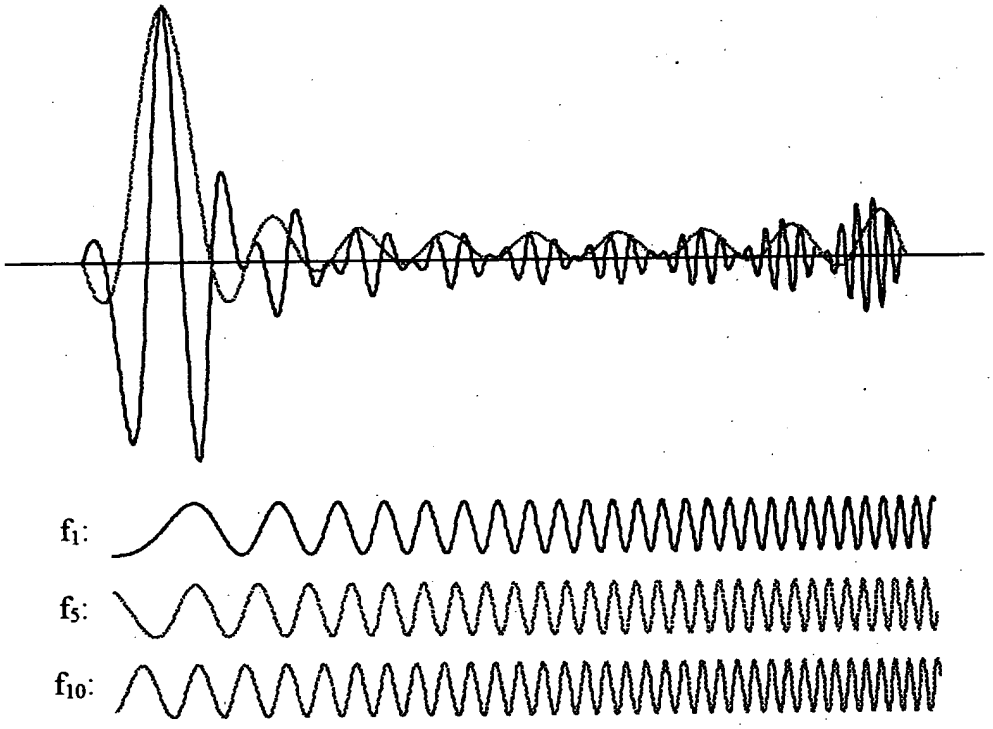
f_1:
f_5:
f_{10}:

FIG. 7A

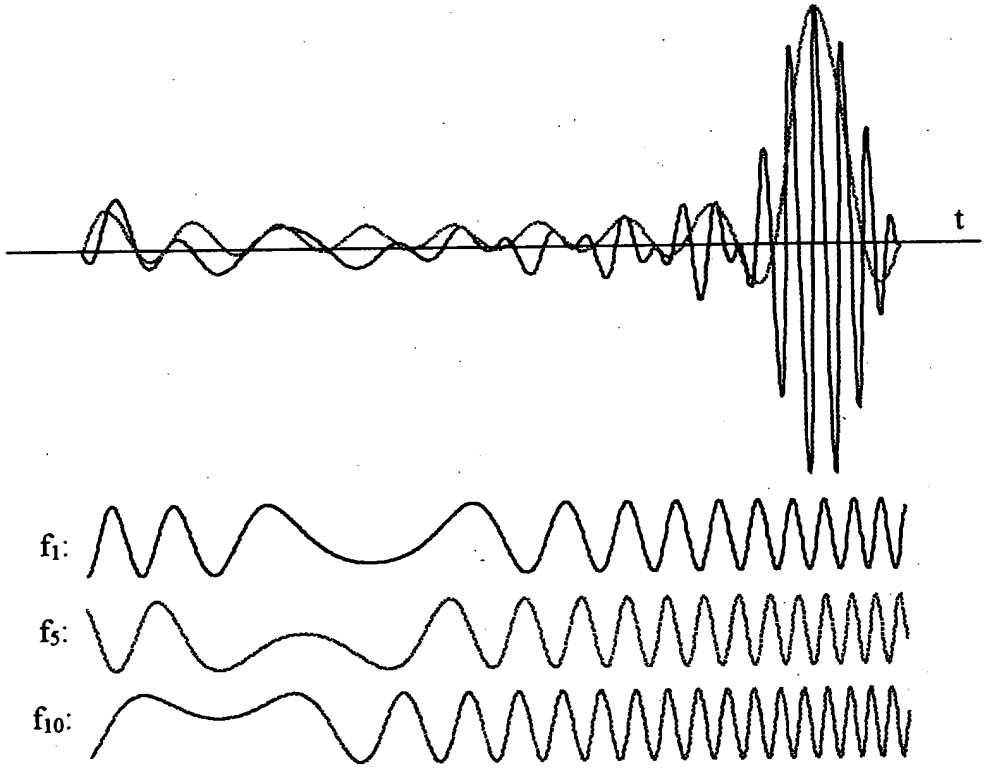
t
f_1:
f_5:
f_{10}:

FIG. 7B

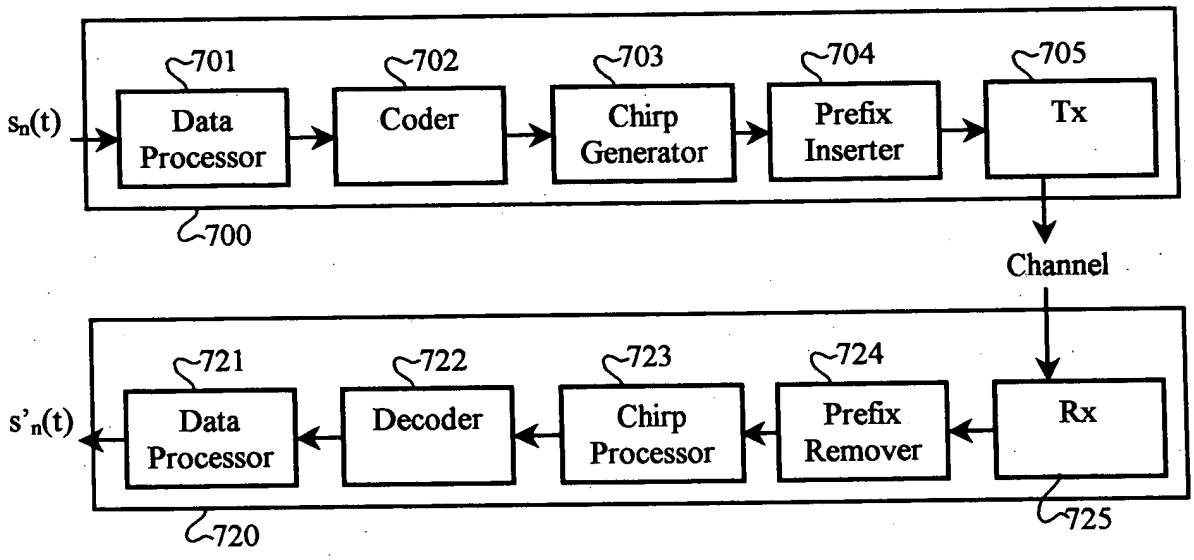
$s_n(t)$
701
Data Processor
702
Coder
703
Chirp Generator
704
Prefix Inserter
705
Tx
700
Channel
$s'_n(t)$
721
Data Processor
722
Decoder
723
Chirp Processor
724
Prefix Remover
Rx
720
725

FIG. 7C

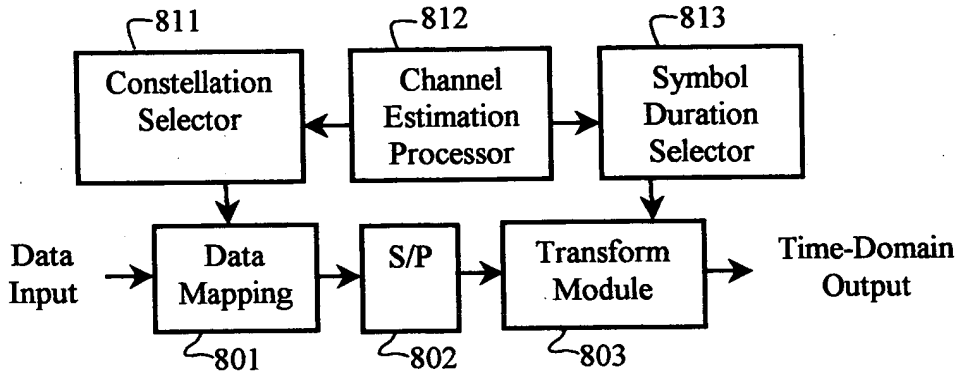
811
Constellation Selector
812
Channel Estimation Processor
813
Symbol Duration Selector
Data Input
Data Mapping
S/P
Transform Module
Time-Domain Output
801
802
803

FIG. 8

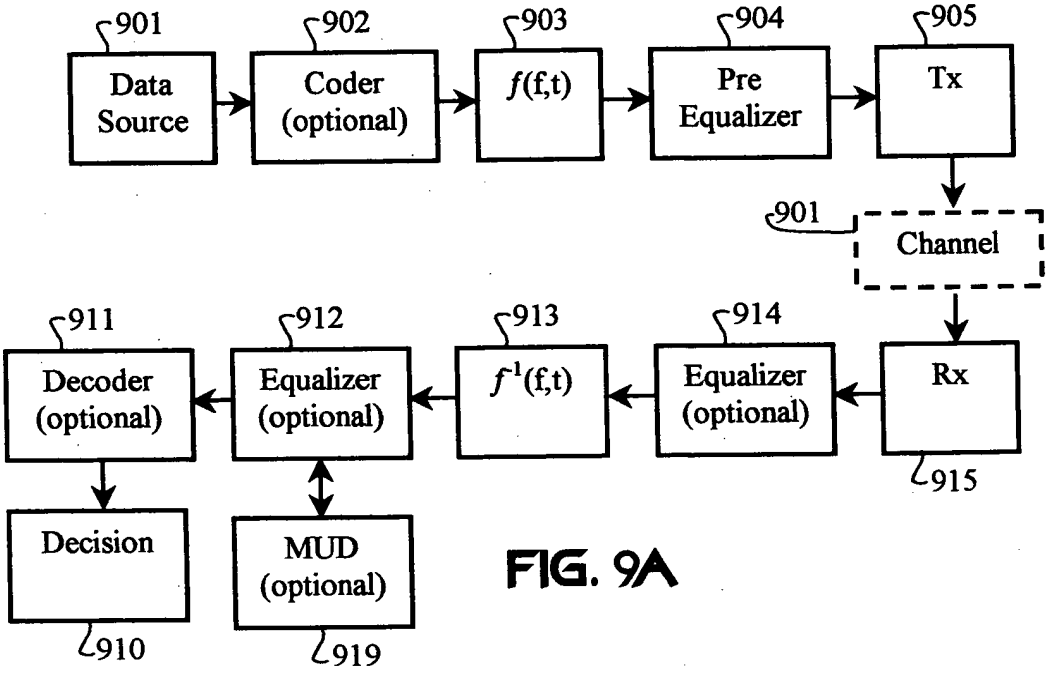
901
Data Source
902
Coder (optional)
903
f(f,t)
904
Pre Equalizer
905
Tx
901
Channel
911
Decoder (optional)
912
Equalizer (optional)
913
f-1(f,t)
914
Equalizer (optional)
Rx
915
Decision
910
MUD (optional)
919

FIG. 9A

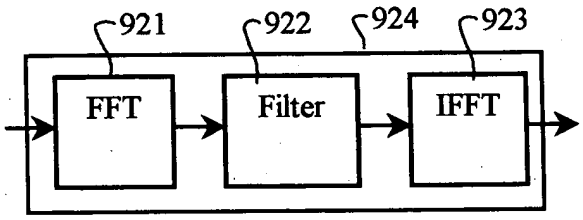

FIG. 9B

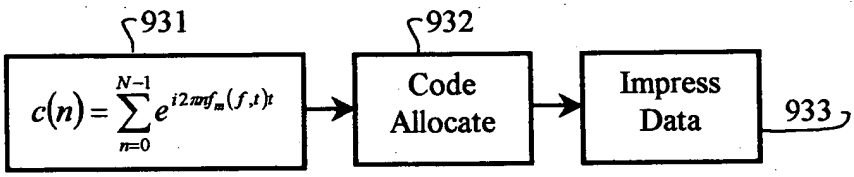

FIG. 9C

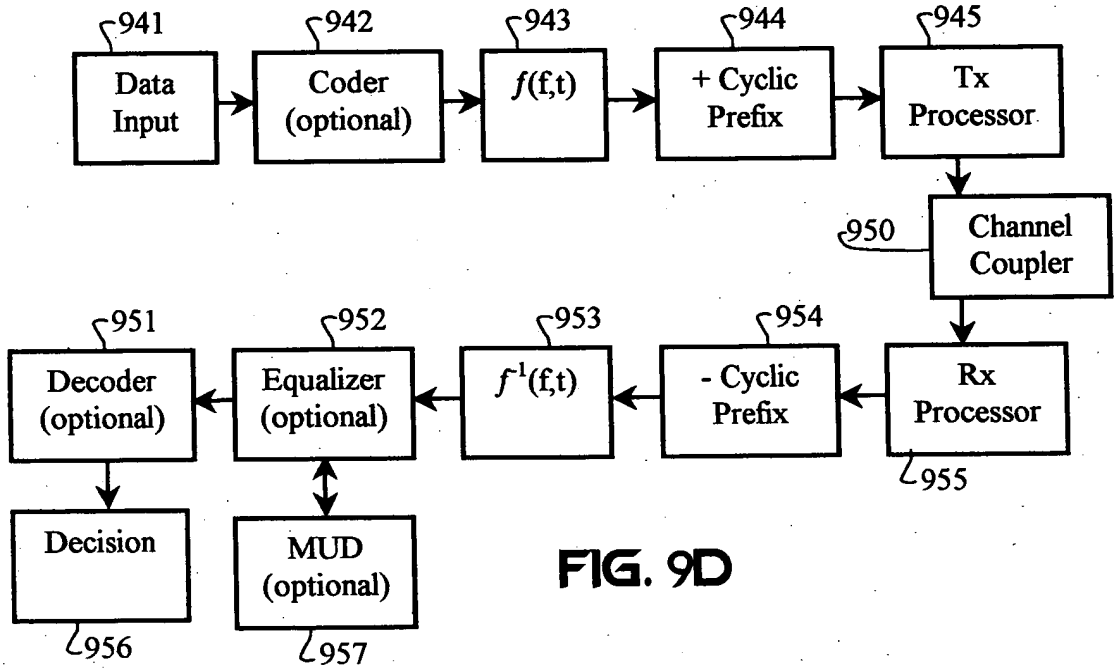

FIG. 9D

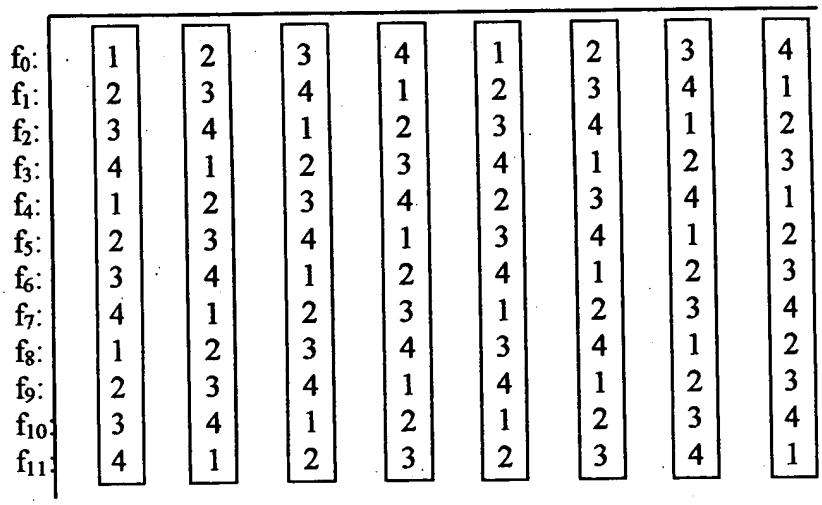

FIG. 10A

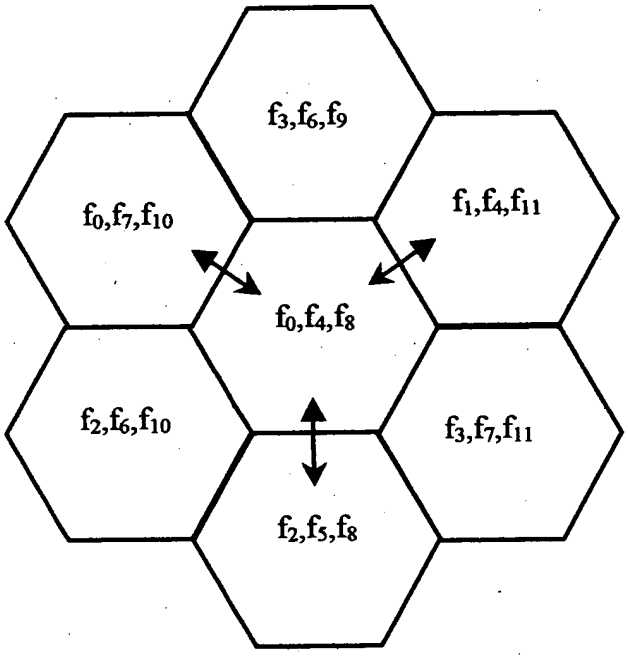

FIG. 10B

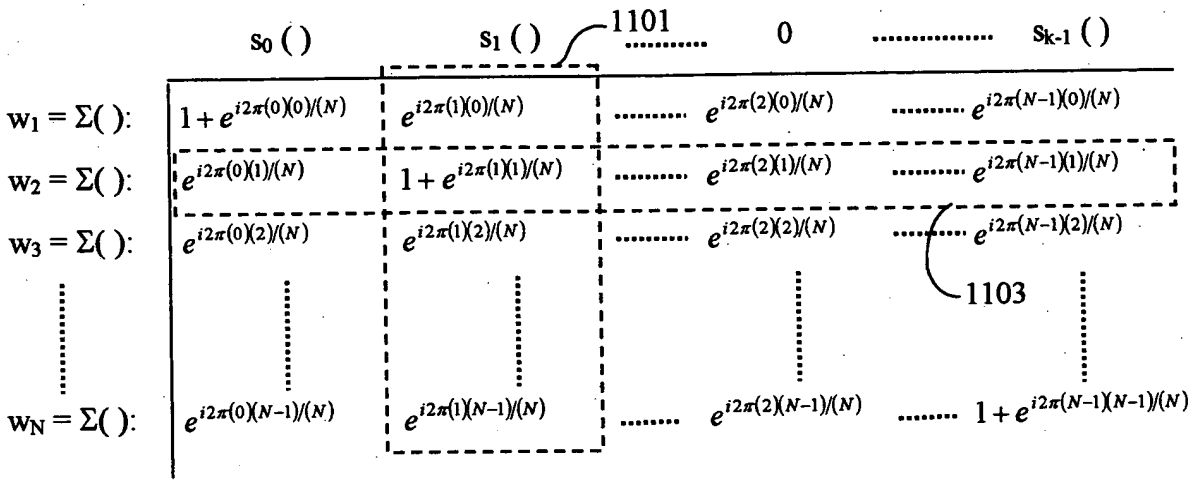

FIG. 11

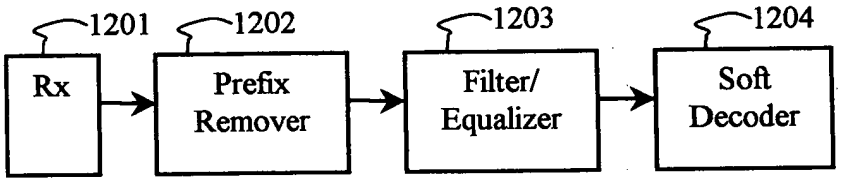

FIG. 12A

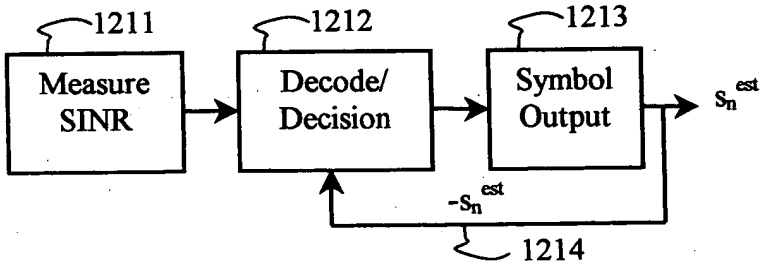

FIG. 12B